Mathematics 6

Module 7

Home Instructor's Guide
and Assignment Booklet

7A

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	

You may find the following Internet sites useful:

- Alberta Learning, **http://www.learning.gov.ab.ca**
- Learning Technologies Branch, **http://www.learning.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.learning.gov.ab.ca**

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Module 7: Transformations

Overview

In Module 7 the student reviews and extends his or her skills in motion geometry and using the coordinate plane. The student reviews slides, flips, and turns, and uses these transformations to create tessellations with various figures. The student investigates why some figures tessellate and some do not. As well, the student creates tessellating designs similar to those of the Dutch artist Maurits Escher.

The student is introduced to optical illusions. The student explores optical illusions that occur in nature and those that are created by humans. The student views 2-D and 3-D optical illusions and investigates how they are made.

Lastly, the student extends his or her knowledge of ordered pairs on a coordinate grid by exploring the global system of latitude and longitude. Also, the student draws figures and pictures by using ordered pairs to plot points. The student investigates what happens when figures are slid or flipped on a coordinate grid.

Assessment

At the end of each of the three lessons in Module 7, the student will be directed to complete an assignment in one of the two Assignment Booklets. The assignments will be graded by the teacher and have a total value of 90 marks.

The student is also expected to complete the Numbers in the News project. This project has a value of 10 marks. Encourage the student to look through a newspaper at least once a week for items in the Scavenger Hunt list. Read through the list with your student and suggest that he or she begin collecting samples of the ideas that he or she already understands. Other samples can be collected as ideas are introduced or extended in the module. Encourage your student to collect as many samples as he or she wishes. At the end of the module, the student will need to choose at least one sample for each question and submit the samples with the Assignment Booklet.

Pacing

The module has been designed so that the student can work at his or her own pace. Each lesson, including the lesson assignment, will take the average student about one week to complete. The Challenge Activity in each lesson is optional.

Allowing extra time for review of basic facts and project work, Module 7 will take the student 4 to 5 weeks to complete.

Lesson 1: Motion Geometry

Overview

In Lesson 1 the student reviews slides, flips, and turns, and uses them to make designs and tessellations. The student investigates why some figures tessellate and some do not. Also, the student explores how to create a tessellating design similar to those of the Dutch artist Maurits Escher.

Special Requirements

The following materials are required for Lesson 1:

- scissors
- light cardboard
- glue
- pattern blocks

Lesson 2: Optical Illusions

Overview

In this lesson the student investigates optical illusions. The student explores optical illusions that occur in nature and those that are created by humans. The student views 2-D and 3-D optical illusions and investigates how they are made.

Special Requirements

The following materials are required for Lesson 2:

- scissors
- cardboard
- tape
- a stemmed glass

Sharing Time

Students are asked to discuss what they are learning with their home instructor at the end of Activity 3.

Activity 3 Sharing Time

Additional websites may be located using the search words *optical illusions* or *figure-ground images*. Monitor these sites carefully for suitability.

Home Instructor's Comments and Questions

_____
Home Instructor's Signature

FOR SCHOOL USE ONLY

Assigned Teacher:

_____

Date Assignment Received:

_____

Grading:

_____

Additional Information:

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_____

FOR HOME INSTRUCTOR USE
(if label is missing or incorrect)

Student File Number:

_____

Date Submitted:

_____

Apply Module Label Here

Name

Address

Postal Code

Please verify that preprinted label is for correct course and module.

Teacher's Comments

_____
Teacher's Signature

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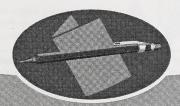## E-MAILING

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Mathematics 6

Module 7

Transformations

ASSIGNMENT BOOKLET 7A

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Lesson 1 Assignment	30	
Lesson 2 Assignment	30	
	60	

Teacher's Comments

Mathematics 6
Module 7: Transformations
Assignment Booklet 7A
Learning Technologies Branch

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ASSIGNMENT BOOKLET 7A
MATHEMATICS 6—MODULE 7: TRANSFORMATIONS
LESSON 1 ASSIGNMENT AND LESSON 2 ASSIGNMENT

Your mark on this module will be determined by how well you do your assignments in the Assignment Booklets.

There are two lesson assignments in this Assignment Booklet. The total value of these assignments is 60 marks. The value of each assignment is stated in the left margin.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate lessons.

Be sure to proofread each assignment carefully.

Lesson 1 Assignment: Motion Geometry

(30)

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. Bryan used pattern blocks to make the sailboat design shown below. Use pattern blocks and follow the directions on the next page to see how Bryan's design tessellates. Show your work.

②   **a.** using only slides

③   **b.** using slides and flips

Cut out the four polygons from the back of this Assignment Booklet. Use them to answer questions 2 to 4.

③

2. **a.** Use the following space. Try to tessellate the octagon by tracing it repeatedly. Do the octagons tessellate?

(1)

b. Which pattern block can you use to fill the gaps in your drawing in question 2.a?

_____

3. If you look at a traditional black and white soccer ball, you will see that its surface is a tessellation of hexagons and pentagons. Each black pentagon is enclosed by five white hexagons.

(2)

a. In the following space, use the cutouts to trace one pentagon and then trace a hexagon on each of its sides.

(2)

b. What happens when you try to make the soccer-ball tessellation on paper? Explain.

_____

_____

4. In the following space, trace the heptagon cutout.

(2)

    a. Use only slides to make a pattern.

(2)

    b. Use only vertical and horizontal flips to make a pattern with repeating gaps.

(2)

    c. Describe the shapes of the gaps in your patterns from questions 4.a. and 4.b.

_____

_____

5. Riordan began with a rectangle and made the tessellating jigsaw shape shown at the right. Trace the shape, glue it on light cardboard, and cut it out. Use the cutout to answer the following questions.

③

    a. Explain and draw pictures to show how Riordan made the shape by cutting pieces from two sides of the rectangle and sliding them to their opposite edges.
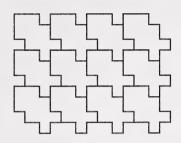
②

    b. Predict the motion you can use to make a tessellation with Riordan's shape. Explain.

    _____

    _____

②

    c. Verify your prediction by tracing your cut-out shape to make a tessellation.

(4)

6. A tessellation is shown below.

Colour the original shape from which the tessellating figure was made, and explain how it was done.

_____

_____

(30)

Lesson 2 Assignment: Optical Illusions

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.
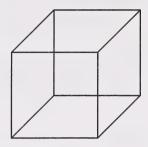
(2)

1. Try this experiment:

- Raise your index fingers to eye level, with your fingertips pointing towards each other.

- Hold one finger in front of each eye, about 6 cm in front of your face.

- Stare at an object in the distance.

- Slowly bring your fingertips closer together until they are about 1 cm apart.

Describe the optical illusion that you see.

_____

_____

_____

_____

2. Depending on which edges are shown in a drawing of a cube, different faces appear to be visible.

②

a. Draw a cube skeleton so that the only faces you can see are three outside faces (front, top, and left) of a solid block.

③

b. Draw a cube skeleton so it appears that you are looking down into a hollow box, and you can see two outside faces (left and front). Shade the visible parts of three inside faces (bottom, back, and right).

③

c. Draw a cube skeleton so it appears that you are looking into a hollow box from the side and you can see two outside faces (top and right). Shade the visible parts of three inside faces (bottom, back, and left).

②

3. In the picture shown at the right, which object appears to be larger? Explain the illusion.

_____

_____

_____

_____

_____

②

4. In the picture shown at the right, which horizontal line segment appears to be longer? Explain the illusion.

_____

_____

_____

_____

_____
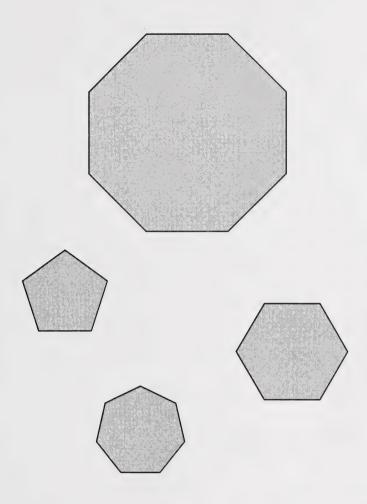
② **5.** In the picture shown at the right, what is the illusion?

_____

_____

_____

_____

_____

② **6.** In the picture at the right, do the horizontal lines appear to be parallel? Explain the illusion.

_____

_____

_____

_____

_____

② **7.** In the picture at the right, explain the intended illusion and what causes it.

_____

_____

_____

_____

_____

_____

②

8. In the picture at the right, which centre circle appears to be larger? Explain the illusion.

_____

_____

_____

_____

_____

②

9. In the picture at the right, which building appears to be larger? Explain the illusion.

_____

_____

_____

_____

_____

②

10. Explain the two different ways of viewing the propeller shown at the right.

_____

_____

_____

_____

_____

②

11. Explain why it would be impossible to actually make the 3-D object shown at the right.

_____

_____

_____

_____

_____

②

12. Explain why it would be impossible to actually build the shelves that are shown at the right.

_____

_____

_____

_____

_____

Learning Aids

Polygons

Mathematics 6

Module 7

Home Instructor's Guide and Assignment Booklet
7B

Mathematics 6
Module 7: Transformations
Home Instructor's Guide and Assignment Booklet 7B
Learning Technologies Branch
ISBN 0-7741-2392-3

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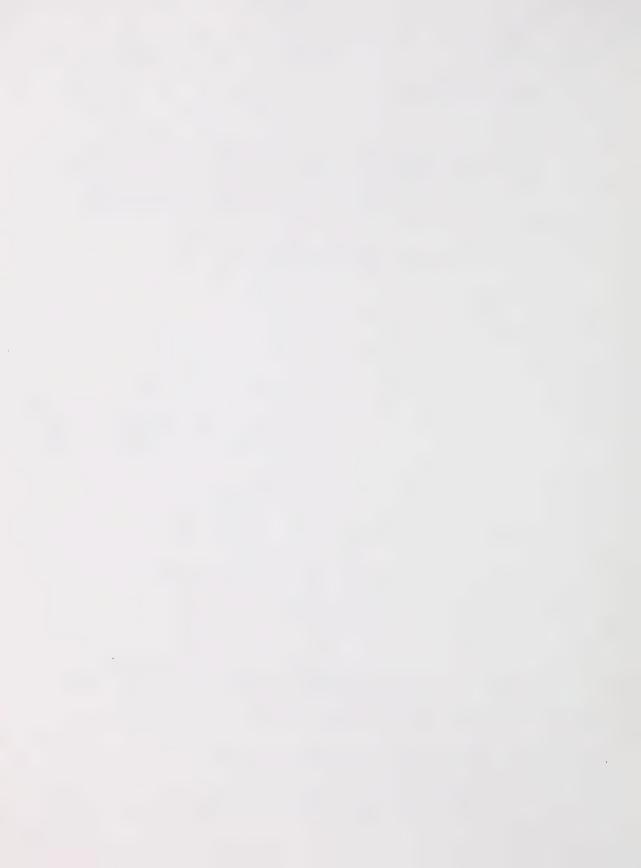
Lesson 3: Plotting Points

Overview

In this lesson the student will extend his or her knowledge of ordered pairs on a coordinate grid by investigating the global system of latitude and longitude. Also, the student draws figures and pictures by using ordered pairs to plot points. The student investigates what happens when you slide, turn, or flip figures on a coordinate grid.

Special Requirements

The following materials are required for Lesson 3:

- tracing paper
- scissors
- cardboard
- tape

Home Instructor's Comments and Questions

_____
Home Instructor's Signature

FOR SCHOOL USE ONLY

Assigned Teacher:

_____

Date Assignment Received:

_____

Grading:

_____

Additional Information:

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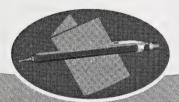## E-MAILING

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Mathematics 6

Module 7

Transformations

ASSIGNMENT BOOKLET 7B

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Lesson 3 Assignment	30	
Numbers in the News	10	
	40	

Teacher's Comments

Mathematics 6
Module 7: Transformations
Assignment Booklet 7B
Learning Technologies Branch

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Teachers	✓
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Home Instructors	
General Public	
Other	

www

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ASSIGNMENT BOOKLET 7B
MATHEMATICS 6—MODULE 7: TRANSFORMATIONS
LESSON 3 ASSIGNMENT AND NUMBERS IN THE
NEWS PROJECT

Your mark on this module will be determined by how well you do your assignments in the Assignment Booklets.

There is one lesson assignment and a Numbers in the News project in this Assignment Booklet. The total value of these assignments is 40 marks. The value of each assignment is stated in the left margin.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate lessons.

Be sure to proofread each assignment carefully.

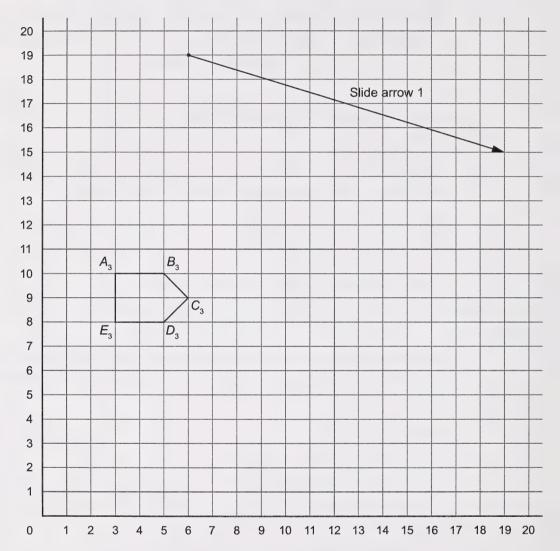**(30)**

Lesson 3 Assignment: Plotting Points

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

(1)

1.

If you use the mirror line, you can flip the rectangle on the left to obtain its image on the right. Describe another way of obtaining this image.
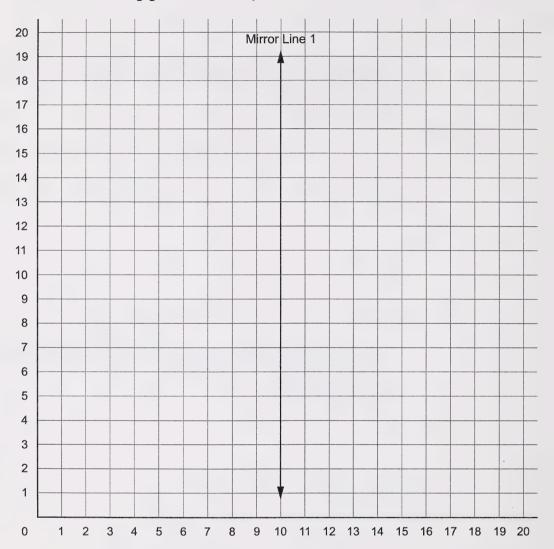
_____

_____

_____

Use the following grid to answer questions 2 to 5.

2. Draw and label pentagon *ABCDE*, where *A* (1, 18), *B* (3, 18), *C* (4, 17), *D* (3, 16), and *E* (1, 16).

3. Slide pentagon *ABCDE* as shown by slide arrow 1 to make *I*₁.

     a. Describe the slide.

_____

_____

(2)   **b.** Draw and label image $A_1B_1C_1D_1E_1$.

(2)   **c.** Write the coordinates for each vertex of image $A_1B_1C_1D_1E_1$.

Vertex	A_1	B_1	C_1	D_1	E_1
Coordinates					

4. If you slide l_1 to make l_2, the coordinates for vertex C_2 are (14, 3).

(2)   **a.** Without counting spaces on the grid (use only the coordinates of the ordered pairs), describe the slide needed to have l_1 make l_2. Explain.

_____

_____

_____

(2)   **b.** Write the coordinates for each of the other vertices of l_2. Explain.

Vertex	A_2	B_2	C_2	D_2	E_2
Coordinates			(14, 3)		

_____

_____

(1)   **c.** Draw and label image $A_2B_2C_2D_2E_2$.

(2)   **5.** If you slide l_2 to make l_3, describe the slide.

_____

_____

_____

Use the following grid to answer questions 6 to 9.

6. Draw and label quadrilateral *ABCD*, where *A* (2, 18), *B* (5, 18), *C* (5, 17), and *D* (2, 16).

②

7. Use mirror line 1 to flip *ABCD* to make I_1.

a. Draw and label image $A_1B_1C_1D_1$.

②

(1)

b. Write the coordinates for each vertex of image $A_1B_1C_1D_1$.

Vertex	A_1	B_1	C_1	D_1
Coordinates				

8. If you flip I_1 to make I_2, the coordinates for vertex D_2 are (18, 4).

(2)

a. Explain how you can use this information to locate mirror line 2.

_____

_____

_____

(1)

b. Draw and label mirror line 2.

(2)

c. Draw and label image $A_2B_2C_2D_2$.

(1)

d. Write the coordinates for each of the other vertices of image $A_2B_2C_2D_2$.

Vertex	A_2	B_2	C_2	D_2
Coordinates				(18, 4)

(2)

9. a. Explain how you can flip image $A_2B_2C_2D_2$ twice, first using a vertical mirror line and then using a horizontal mirror line, so that it is moved back to quadrilateral *ABCD*.

_____

_____

_____

_____

(2)

b. From question 9.a., draw and label flip image $A_3B_3C_3D_3$.

(10)

Numbers in the News

Go through the Scavenger Hunt list for Module 7 to make sure you have clipped at least one example for each question. Ask your home instructor to check the samples you found. Choose the sample you wish to use, and label each one with the scavenger hunt item it matches. Organize your samples and put them together with any other information required. Submit your project with this Assignment Booklet.

Ask yourself the following questions:

- Is my Numbers in the News project complete? (Have I included all my samples?)

- Do my samples show the ideas clearly? (Are my examples appropriate?)

- Did I take care to be neat when organizing and labelling my work?